1856MNRAS..16..149D

val between the observations; but such occultation would not have been visible in England, as the planet would have set, before the immersion took place.

"The apparent magnitude of the star was 9 to 10.

"*Eastbourne, Feb.* 7, 1856."

Notes on an Occultation of a Star by Saturn.

By the Rev. W. R. Dawes.

(*Extracts of Letters to the Astronomer Royal.*)

"Last evening, on turning my equatoreally-mounted telescope upon *Saturn*, I perceived a small fixed star on the preceding side of the planet, and almost precisely in the line of the major axis of the ring produced. Allowing for the brilliancy of *Saturn*, I estimated it be of the 9th magnitude. It was distant from the western extremity of the ring about 40″. The third satellite, *Tethys*, was very near its greatest elongation on the same side.

"As it appeared evident that an occultation must happen, I measured with the wire micrometer the difference of R.A. of the star and the western extremity of the ring; and from this, and *Saturn's* daily motion in R.A., I found that the G.M. time of occultation by the ring would be about $15^h\ 6^m$. Having also observed the difference of N.P.D. of the star and the most southerly point of the edge of the ring (considerably to the west of the southern extremity of its minor axis), I found from this and the daily motion in N.P.D., the difference of N.P.D. at the expected time of occultation. The threads of the micrometer having been set to include this difference of N.P.D., and placed equatoreally, the southern thread was made to touch the southern point of the ring; and the other consequently showed, with sufficient exactness, the point on the edge of the ring where the occultation would take place, and also indicated the path of the star behind the planet. It thus became evident that the star would disappear a little to the south of the western extremity of the major axis; and that it would not make its appearance at all in the interval between the ring and the planet, but would just graze the southern edge of it; allowance being made for the northward motion of *Saturn*, amounting to about 0″·18 in an hour. Though the interest of the phenomenon was thus greatly diminished, I thought it worth while to observe the occultation with the view of ascertaining whether so small a star would continue to be distinctly visible up to the very edge of the ring; and also, with some hope, that if the planet should be sufficiently well seen when about 7^h west of the meridian, the star might appear between the bright rings.

"At $11^h\ 25^m$, G.M.T., *Tethys* was very nearly south of the star, and at a distance of about 5″. The star was estimated to be rather brighter than the fifth satellite, *Rhea.*

"At $14^h\ 50^m$, G.M.T., *Saturn* had approached very close to

1856MNRAS..16..149D

the star; which, however, was still at times distinctly separated from the edge of the ring: but usually the edge was sadly tremulous. Power 162.

" At $15^h\ 1^m \pm$ I had the last distinct and certain view of the star during a few moments of steady vision. It was just in contact with the edge, and looked like a huge mountain projecting from it. Great tremulousness of the image precluded another view of the star. The last-mentioned time is a little uncertain; for I kept my eye for about two minutes at the telescope, in hopes of one more firm glimpse; which, however, did not occur.

" The state of the air soon afterwards became so bad, that the division between the rings was only occasionally visible; and it therefore seemed useless to await the passing of that division over the star. Had the planet been near the meridian, and as steady and well defined as it had been when in that position, I have little doubt that the star, though of so small a magnitude, might have been seen between the rings. It is to be hoped that this interesting phenomenon has been observed in America.

" When *Saturn* has removed to a sufficient distance from the star, I shall endeavour accurately to gauge its magnitude.

" The telescope employed in these observations has a focal length of nearly 10 feet, with a clear aperture of 8 inches, and is the work of Mr. Alvan Clark of Boston, U.S. Its defining power is very fine.

" Hoping that this observation, though far less complete than I could wish, may yet possess sufficient interest to excuse my troubling you with the present communication.

" I remain, yours faithfully, W. R. Dawes.

" *Wateringbury, Maidstone,* 31 *January,* 1856."

"The early part of last night was very clear here, and I took some pains to obtain an accurate gauge of the magnitude of the fixed star, which was occulted on the 30th ult. To relieve the eye from the light of *Saturn*, a very small field of view was employed: but when the star was placed in its centre, the sky around it was evidently somewhat illuminated by the planetary twilight. The aperture on the telescope (the finder of my equatoreal), which rendered it just steadily visible, gave its magnitude $9\frac{1}{4}$ of my scale. The planetary illumination of the field, though at a distance of above 9′ from *Saturn's* centre, might make it appear a quarter of a magnitude smaller than the truth,—but scarcely, I think, half a magnitude. I intend, however, to resume this examination in a week or so, if opportunity should be afforded, when *Saturn* will have removed to more than twice his present distance from the star, and the moon will scarcely have become troublesome.

" I confess I was not prepared for the distinct visibility of so small a star when close to *Saturn's* ring; especially after Professor Secchi's remarks on the extreme faintness of the seventh-magnitude star, when it was very close to the planet on the 13th

1856MNRAS..16..151.

Nov. 1854. (See *Astron. Nachr.* No. 982, p. 346, where it is not stated whether that star was actually *occulted* by *Saturn.*) When the star I observed was close to *Tethys*, I estimated it to be fully one magnitude, or perhaps one and a half larger than that satellite."

"*February* 4."

"I have carefully, and under favourable circumstances, gauged the magnitude of the small star, which was occulted by *Saturn* on January 30. I find it is rather brighter than the 8¾ mag. and decidedly below the 8½. *Saturn* was excluded from the field during the observations; and the sky round the star was not perceptibly illuminated by the light from the planet: yet, to make sure of not underrating the magnitude of the star, it may, I think, be safely stated decimally as 8·6.

"At the same time, and by the same method of apertures, I gauged the magnitude of the companion of *Polaris;* which resulted, as nearly as possible, one magnitude lower, or about 9¾. According to the ratio I employ, the star occulted by *Saturn* is therefore fully four times as bright as the companion of *Polaris.* Its approximate place is

"R.A. $5^{h}\ 32^{m}\ 18^{s}$; N.P.D. 67° 48′ 24″.

"*March* 31."

Mr. De La Rue laid before the Meeting a coloured drawing of *Saturn*, as seen with his 13-inch Newtonian equatoreal, on March 28 and 29, 1856. Adopting the outer diameter of the outer ring as the unit for comparison, Mr. De La Rue finds that the relative dimensions which best agree with his observations are as follows:—

Outer diameter of outer ring	1·00000
Diameter of fine division	0·95417
Inner diameter of outer ring	0·88702
Outer — — middle —	0·87099
Inner — — — —	0·66106
— — — faint —	0·55586
Equatoreal diameter of the planet	0·44338

There was also exhibited at the Meeting a drawing of *Saturn* as seen at the Observatory of Mr. Barclay, Knotts Green, Leyton. The telescope employed was a refractor of 7½ inches aperture, by Cooke of York, mounted equatoreally and driven by clockwork. The general resemblance which the drawing bore to other authenticated delineations of the planet was very satisfactory, and gave promise of future usefulness.